

CLAIMS

1. Process for preparing a photovoltaic device including at least one film of at least one semiconductive metal oxide with a major amount of a nanosized photocatalytic crystalline phase, said process comprising the steps of
 - a) obtaining the at least one semiconductive metal oxide with a major amount of a photocatalytic crystalline phase;
 - b) forming a suspension of the at least one semiconductive metal oxide in an aqueous solution containing at least a hydrosoluble organic polymer and a hydrolysable organic derivative of said metal;
 - c) depositing the resulting suspension on a substrate to give a film;
 - d) treating said film at a temperature ranging between about 30°C and about 100°C in the presence of water.
2. Process according to claim 1 wherein the semiconductive metal oxide is titanium oxide with a major amount of anatase phase.
3. Process according to claim 1 wherein the hydrosoluble organic polymer is selected from polyvinylpyrrolidone, polyethylene glycol, polypropylene glycol, polytetramethylene glycol, cellulose acetate, cellulose nitrate, hydroxypropylcellulose, polyvinyl alcohol, polyvinyl acetate, polyvinyl chloride.
4. Process according to claim 3 wherein the hydrosoluble organic polymer is polyethylene glycol.
5. Process according to claim 4 wherein polyethylene glycol has a molecular weight ranging between 600 and 300,000.
6. Process according to claim 5 wherein polyethylene glycol has molecular weight ranging between 3,000 and 10,000.
7. Process according to claim 3 wherein a hydrosoluble organic polymer contains monomeric units bearing hydroxy groups in a percentage lower than 90% by weight.
8. Process according to claim 1 wherein the hydrolysable organic derivative of said metal is an ester derivative.

9. Process according to claim 8 wherein said ester derivative contains one or more group/s selected from hydroxy, alkoxy, carbonyl and carboxy.
- 5 10. Process according to claim 1 wherein the hydrolysable organic derivative of said metal is selected from titanium diisopropoxide bisacetyl acetate, titanium dibutoxide bis(2,4-pentanedionate), titanium lactate, titanium methacrylate triisopropoxide, titanium methacryloxyethylacetate triisopropoxide, titanium oxide bispentanedionate, titanium oxide bistetramethylheptanedionate, titanium diisopropoxide bistetramethylheptanedionate, titanium allylacetoacetatetriisopropoxide.
- 10 11. Process according to claim 10 wherein the hydrolysable organic derivative is titanium diisopropoxide bisacetyl acetate.
12. Process according to claim 1 wherein the aqueous solution comprises a stabilizer.
- 15 13. Process according to claim 12 wherein the stabilizer is selected from acetic acid, citric acid, propionic acid, butyric acid, butylacetic acid, vinylacetic acid, oxalic acid, succinic acid, maleic acid, adipic acid, stearic acid, lactic acid. .
14. Process according to claim 13 wherein the stabilizer is acetic acid
- 20 15. Process according to claim 14 wherein the stabilizer is in a molar amount more than double with respect to the hydrolysable organic titanium compound.
16. Process according to claim 15 wherein the molar ratio hydrolysable organic derivative/stabilizer is of from 1:4 to 1:10.
- 25 17. Process according to claim 1 wherein step d) is performed at a temperature ranging between 80°C and 100°C.
18. Process according to claim 1 wherein step d) is performed for a time ranging between 2 hours and 5 hours.
19. Process according to claim 1 wherein said step d) is preceded by a
- 30 20. Process according to claim 1 wherein the photovoltaic device is a smart card.

21. Process for preparing a film comprising at least one semiconductive metal oxide with a major amount of a nanosized photocatalytic crystalline phase, said process comprising the steps of
- 5 a) obtaining the at least one semiconductive metal oxide with a major amount of a photocatalytic crystalline phase;
- b) forming a suspension of the at least one semiconductive metal oxide in an aqueous solution containing at least a hydrosoluble organic polymer and a hydrolysable organic derivative of said metal;
- 10 c) depositing the resulting suspension on a substrate to give a film;
- d) treating said film at a temperature ranging between about 30°C and about 100°C in the presence of water.